1. The ability to roll one’s tongue is a dominant trait. A person who cannot roll his/her tongue would be:
   a. a heterozygote  
   b. a homozygote  
   c. it is impossible to tell.

   Because tongue-rolling is recessive, the only way a person would be unable to roll his/her tongue would be if s/he were homozygous mutant.

2. The ability to roll one’s tongue is a dominant trait. A female with the ability to roll her tongue marries a man who cannot. The probability that your children will be able to roll their tongues is:
   a. 0%  
   b. 25%  
   c. 50%  
   d. 100%  
   e. It is impossible to tell without more information

   A woman would be able to roll her tongue if she were genotypically TT or Tt, since tongue rolling is dominant. Thus, given that her mate is tt (because he cannot roll his tongue), the probability is either 0% (if she is genotypically homozygous [TT]) or 50% (if she is genotypically heterozygous [Tt]); it is impossible to predict the probability unless we know her genotype.

Huntington’s Disease is a fatal neurologic disorder marked by an inability to control skeletal muscle movement. Although fatal, it frequently goes un-diagnosed until a person is in his/her mid-40s or later, depending upon the exact DNA sequence that is inherited. Answer the following four questions with respect to the heritability of Huntington’s disease.

3. How many people with Huntington’s disease do you know? Based upon this alone, which of the following can you conclude?
   a. The allele that causes Huntington’s Disease is wild-type  
   b. The allele that causes Huntington’s Disease is mutant  
   c. The allele that causes Huntington’s Disease is dominant  
   d. The allele that causes Huntington’s Disease is recessive

   Mutant alleles are less abundant in the population. Although I tell you that inheritance is Dominant, you cannot know that from the fact that you don’t know many (if any) people with Huntington’s disease—all you can tell from that information alone is that the allele for developing the disorder is rare.

4. The wild-type allele is frequently expressed as a capital letter while the mutant allele is expressed as a lower-case letter. Using ‘H’ for wild-type and ‘h’ for mutant, which of the following genotypes would potentially develop Huntington’s Disease?
   a. HH  
   b. Hh  
   c. hh  
   d. both a and b  
   e. both b and c  
   f. a, b or c
Because development of Huntington’s Disease is dominant, people who are heterozygous (Hh) or homozygous (hh) for the mutant [less-abundant] allele would develop the disease; only people who are HH (homozygous for the wild-type allele) would be spared of the disease.

5. A woman with Huntington’s disease (though she does not know it) has a child with a man who is both genotypically and phenotypically normal (wild-type). Assuming that she is heterozygous for the mutant allele [which is more likely than being homozygous for the mutant allele given its rarity within the human population], the probability that their offspring will eventually develop Huntington’s Disease is:
   a. 0%
   b. 25
c. 50%
d. 100%

![Genetic Chart]

The question tells us that Mom has only one mutant allele (h) because it says that she is heterozygous. We know that she is not Hh because she HAS the disease. Because Dad is genotypically normal, we know that his genotype is HH. Thus, the likelihood is 50% (half) will carry the mutant (h) allele and develop the disease.

6. A person in his 60s has not developed any symptoms of Huntington’s Disease. His genotype is likely:
   a. HH
   b. Hh
   c. hh
d. It is impossible to tell

Because the development of Huntington’s Disease is dominant, only those with two wild-type (H) alleles will be spared from the disorder.

7. Having the ability to read crystal balls, I predict that a newborn baby boy will die from a neurodegenerative disorder before the age of 4 due to the build-up of certain membrane lipids. If I am correct, the baby’s genotype is:
   a. TT
   b. Tt
c. tt
d. I don’t know and I don’t give a @$#k!

The neurodegenerative disorder to which I’m referring is Tay-Sachs disease, which was discussed in class. Tay-Sachs is a recessive disorder, so an individual will develop the disease ONLY if s/he is homozygous mutant (tt).
8. Colorblindness is due to a recessive allele located on the X chromosome. A male who is colorblind has a genotype of:
   a. BB
   b. Bb
   c. bb
   d. none of the above
Males only have a single X chromosome. Since the disease for color-blindness is on the X chromosome, males can, at most, have a single allele. Thus, the genotype of a color-blind male would be characterized as a ‘b’ only (not bb, because he does not have two alleles; I hope that makes sense).